NEW MEXICO
ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau

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Memorandum

To: **LaDonna Turner, Site Assessment Manager**
Response and Prevention Branch
U.S. Environmental Protection Agency, Region 6

From: **Dana Bahar, Manager, Superfund Oversight Section,**
Ground Water Quality Bureau, New Mexico Environment Department

Date: **October 31, 2011**

Subject: **Pre-CERCLIS Screening Assessment of the Section 35 Mine, New Mexico: No Further Action under CERLCA Recommended**

Site name	Section 35	**Alias**	Elisabeth	**Street Address**	NA
City	NA	**State**	New Mexico	**Zip code**	NA
County	McKinley County				
Latitude	35° 23' 42.11" N	**Longitude**	107° 45' 44.85" W		

Site physical description:
The Section 35 mine is located in Section 35, T14N, R9W, approximately 3.4 miles northeast of the junction of State highways 509 and 605. The Section 35 mine was an underground uranium mine in the Ambrosia Lake Mining Sub-District. The surface facilities and main shaft are located in Section 35 and the underground workings extend into parts of Section 35 and Section 26. The Section 35 mine had approximately 44 acres of disturbed surface (Ref. 1). Reclamation began at the Section 35 Mine site in 1994 when the Quivira Mining Company (QMC) dismantled and removed the Ion Exchange (IX) plant along with the excavation of contaminated soil and filling of three earthen lagoons. In 1999 four additional lagoons were reclaimed (Ref. 2). In 2003, the demolition and disposal of surface facilities was completed. In 2005 some minor contour work and revegetation of the surface along with the plugging of the main shaft and some ventilation holes was completed (Ref. 3). To date neither the New Mexico Energy Minerals and Natural Resourses Department (NMEMNRD) nor the New Mexico Environment Department (NMED) has released the Section 35 mine from further requirements of the New Mexico Mining Act Rules [19.10.5 NMAC] or the New Mexico Water (NMWQCC) Control Commission Regulations [20.6.2 NMAC] (Ref. 1).

Site identification:
The Section 35 mine is one of approximately 97 legacy uranium mines identified in the Ambrosia Lake Mining Sub-District of the Grants Mining District. On-going remedial activities at the Section 35 mine are being conducted by Rio Algom Mining, LLC (RAML) under state oversight in accordance with NMWQCC Regulations [20.6.2.3000 NMAC] under discharge permit (DP)-

67, DP-264 and DP-362 and a separate Abatement Plan.

Site summary:
Uranium exploration of the Section 35 mine commenced as early as 1957 with mine development initiated in 1969. With subsequent completion of the mine shaft, the first ore production from the mine occurred in September 1971. In 1984 the Section 35 mine shut down conventional mining activities due to the depressed condition of the uranium market. However, areas of the mine remained available to old stope leaching methods; but no mining activity including dewatering has occurred at the mine site since September 1991 when mine dewatering was discontinued (Ref. 2). To date, the Section 35 mine has produced over 2.5 million tons of ore (Ref. 3).

Reclamation began at the Section 35 mine site in 1994 when the QMC dismantled and removed the Ion Exchange (IX) plant along with the excavation of contaminated soil and filling of three earthen lagoons. In 1999 four additional lagoons were reclaimed (Ref. 2). In 1999, the Section 35 mine received an "existing mining operation" permit (MK009RE) from NMEMNRD under the New Mexico Mining Act (NMMA) [19.10.5 NMAC]. In 2003, the demolition and disposal of surface facilities was completed. In 2005 some minor contour work and revegetation of the surface along with the plugging of the main shaft and some ventilation holes was completed (Ref. 3). To date the NMEMNRD has not released the Section 35 mine from further requirements of the NMMA.

The Section 35 mine was dewatered from 1971 through 1990. The average discharge rate from the Section 35 mine was 1,000 gallons per minute between 1973 and 1977. Until 1976 mine water from the Section 35 mine was largely untreated and was discharged directly into the natural surface drainage. Starting in 1976 mine water was run through the new IX facility at the Section 35 mine and discharged to a series of settling ponds prior to discharge (Ref. 4). NMED originally approved a ground water DP-67 in 1980 to Kerr McGee which authorized discharge of mine water from the Section 35 and Section 36 mines. DP-67 covered the operation of an IX facility located at the Section 35 mine for the recovery of uranium from mine water, the associated settlement ponds and the final outfalls. In 2005, RAML notified NMED that a preliminary assessment identified that discharge of mine water from the Section 35 and 36 mines has resulted in contamination of soil and alluvial ground water. Pursuant to the NMWQCC Regulation [20.6.2.1203 NMAC], NMED considered contamination from the Section 35 and 36 mines to be the result of an unpermitted discharge, prior to the implementation of DP-67 and subject to corrective action. Based on the Corrective Action Report findings received by NMED, NMED notified RAML in 2008 to submit a Stage 1 Abatement Plan. Also NMED has determined that DP-67 restoration and closure requirements cannot be met or the permit terminated until the above contamination is appropriately addressed (Ref. 5).

In 1983 NMED determined that the old stope leaching process would require a DP under the NMWQCC Regulations [20.6.2.3000 NMAC]. In 1985, DP-362 authorized QMC to conduct old stope leaching by recirculating mine water with some mine water fortified with sodium bicarbonate or sulfuric acid to be injected into 8 underground uranium mines in the Ambrosia Lake Mining Sub-District for the secondary recovery of uranium. These 8 mines included the Section 17, 19, 22, 24, 30, 30W, 33 and 35 mines. In 1999 a modification to DP-362 included four additional underground uranium mines; the Section 13, 15, 23 and 25 mines. NMED records are not conclusive that all mines listed in DP-362 were actually used for old stope leaching. QMC ceased all underground injections by 2000. To ensure an adequate Closure Plan is implemented in accordance with NMWQCC Regulations [20.6.2.3107 NMAC], and pursuant

to Condition 6 of DP-362, RAML submitted a ground water flow and geochemical model to NMED for approval. NMED approved the ground water flow model but not the geochemical model. In 2008, NMED required RAML to submit an Abatement Plan to assess regional ground water conditions related to the RAML mines addressed in DP-362 with the exception of the Section 13 and 15 mines which RAML never owned or operated. In 2009, NMED allowed RAML to conduct abatement under NMWQCC Abatement Regulations [20.6.2.4000] rather than as a condition of DP-362 (Ref. 3).

In 1983, NMED approved DP-264 for the backfilling of mined out stopes using tailing sands in the Section 35 and the Section 36 mines which occurred from 1983 through 1985. The backfilling to the mined out stopes was done using a slurry mixture of mine water and tailing sands. Bulkheads were erected at the stope accesses to retain the sand tailings and allow water to drain. The water was then collected and treated along with the mine water as part of dewatering activities. RAML did not submit a timely renewal application for the DP in 1995 to address the closure of the Site under a DP Closure Plan. NMED is currently reviewing RAML documents to determine if all materials have been sufficiently removed or if additional abatement is required (Ref. 6). If additional abatement is required, it may be completed under abatement plan under DP-362.

Targets:
Wells that are registered with the New Mexico Office of the State Engineer (OSE) and located within a 4-mile radius are shown in Table 1. The Section 35 mine is within the 4-mile radius of the junction of State highway 509 and 605 which includes a small community, and residences, that rely on private and domestic wells (Ref. 7). Table 2 identifies domestic wells that were sampled by NMED in 2009. Results show ground water concentrations exceeding the Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCL) and the NMWQCC ground water standards (Ref. 8).

Airborne Spectral Photometric Environmental Collection Technology (ASPECT) operated by EPA has developed exposure rate contour map of the Ambrosia Lake Mining Sub-District that includes the Section 35 (NM0019) mine (Figure 2). The EPA ASPECT exposure rate measurements were performed in part to evaluate if surface reclamation has been effective in the long-term elimination of such threats to human health and the environment. The map estimates radiation exposure rates on the ground and can be used to identify hazardous levels of radiation. Typical exposure rates in New Mexico range from 5 – 20 micro Roentgens per hour (µR/hr.). The ground surface exposure rates in and around the Section 35 mine are over one thousand times higher than the typical range, that is, ground surface radiological hazards were identified at most Ambrosia Lake uranium mine sites including the Section 35 mine (Ref. 9).

Site ownership and Potential Responsible Parties:
Kerr McGee Corporation owned and operated the Section 35 mine from 1969 until 1984. QMC, a subsidiary of Kerr McGee Corporation, took over mining operations in 1984. Rio Algom Mining Company (RAMC) acquired QMC in 1989 (Ref. 10). Billiton plc purchased RAMC in 2000. Broken Hill Proprietary Company Limited (BHP) merged with Billiton plc to form BHP Billiton Limited, of which RAML is a wholly-owned subsidiary (Ref. 11).

File review:
Files that were reviewed for this assessment are listed below.

Site reconnaissance:
The last documented site reconnaissance occurred in 2004 by NMEMNRD personnel (Ref. 12). A site reconnaissance was not performed as part of this Pre-CERCLIS screening assessment.

Recommendation:
Data collected from the Ambrosia Lake Mining Sub-District has shown a release of CERCLA hazardous substances to both the ground surface, and ground water. In addition, an Aerial Radiological Survey conducted by EPA of the Ambrosia Lake Mining Sub-District measured radiological exposure rates above background in and around the eleven RAML mine sites.

On-going remedial activities at the Section 35 mine are being conducted by RAML under state oversight in accordance with NMWQCC regulations under DP-67, DP 264 and DP-362 and a separate Abatement Plan. RAML is required to investigate and abate radiological and metal contamination from the discharge of mine water, regional impacts from legacy uranium sites to the ground water system and surface and radiological hazards to ensure long-term elimination of such threats to human health and the environment.

NMED recommends that no further action is required at the Section 35 mine at this time. SOS may revisit this recommendation should additional information become available that indicates that an imminent threat to human health or the environment exists such that further action under CERCLA is warranted. NMED SOS also proposes to periodically review new data as it becomes available and incorporate it into the ground water conceptual model for the Grants Mining District. A generalized investigation of potential ground water impacts from former uranium mines within the Grants Mineral District is recommended as part of regional ground water quality characterization.

References:
1. New Mexico Energy, Minerals and Natural Resources Department, 2007, Abandoned and inactive uranium mines in New Mexico database, Mining and Minerals Division.
2. Quivira Mining Company, 2002, Discharge Plan-67 Permit Termination Request, Report to New Mexico Environment Department.
3. New Mexico Environment Department, Discharge Plan-362.
4. Intera Incorporated, 2007, Evaluation of Impacts from Section 35 and 36 Mine Dewatering, Ambrosia Lake Valley, New Mexico, Rio Algom Mining, LLC
5. New Mexico Environment Department, Discharge Plan-67 files.
6. New Mexico Environment Department, Discharge Plan-264
7. New Mexico Office of the State Engineer, 2011, New Mexico water rights reporting system database, point of diversion by location, four mile radius of the Sandstone Mine.
8. New Mexico Environment Department, 2010, Phase 1 Site Investigation Report San Mateo Creek Legacy Uranium Sites, CERCLIS ID# NMN00060684, McKinley and Cibola Counties, New Mexico.
9. EPA, 2011, Airborne Spectral Photometric Environmental Collection Technology Exposure Rate Contour Map of Ambrosia Lake Mining District.
10. Quivira Mining Company, 1994, Letter to the Mining and Minerals Division.
11. Rio Algom Mining, LLC, 2001, Letter to the Mining and Minerals Division.
12. Mining and Minerals Division, 2004, Annual Inspection Report of Rio Algom Mining, LLC in the Ambrosia Lake Mining District.

Table 1. Domestic Wells within a Four Mile Radius of the Section 35 Mine, Office of the State Engineer[1]

OSE Well Number	Well Use	Well Owner	Section	Town-ship	Range	Depth of Well	Depth to Water	Water Column
Wells (>2 and <3 miles)								
B 01190	Livestock[a]	(b) (6)				390	37	353
B 00456	Livestock[a]					700	*	*
Wells (>3 and <4 miles)								
B 01104	Domestic	(b) (6)				303	247	56
B 01115	Domestic					478	204	274
B 01636	Domestic					260	80	180
B 01544	Domestic					715	624	91
B 00659	Domestic					220	190	30
B 00390	Irrigation[a]	FERNANDEZ CO. LTD	18	13N	08W	1800	900	900

* = Value Unknown

[a] = Wells are permitted for household use

[1] = Taken from Sandstone Mine Well Data

Table 2. Domestic Wells Sampled within a Four Mile Radius of the Section 35 Mine

OSE Well Number	Well Use	Well Owner	Gross Alpha	226RA	U	SE
			picoCuries/Liter (pCi/L)		micrograms/Liter (µg/L)	
B 01104	Domestic	(b) (6)	16.0	0.01	20.6	13.2
B 01115	Domestic		46.6	0.96	63.9	73.6
B 00659	Domestic		20.7	0.01	13.8	66.2
B 01636	Domestic		6.2	0.42	10.1	27.1
*	Domestic		56.0	2.9	2.0	2.0
*	Domestic		0.9	0.28	2.5	2

* = Not permitted with the NMOSE

Bold = Exceeds the EPA MCL and or NMWQCC Ground Water Standard.

pCi/L = picoCuries/Liter

µg/L = micrograms/Liter

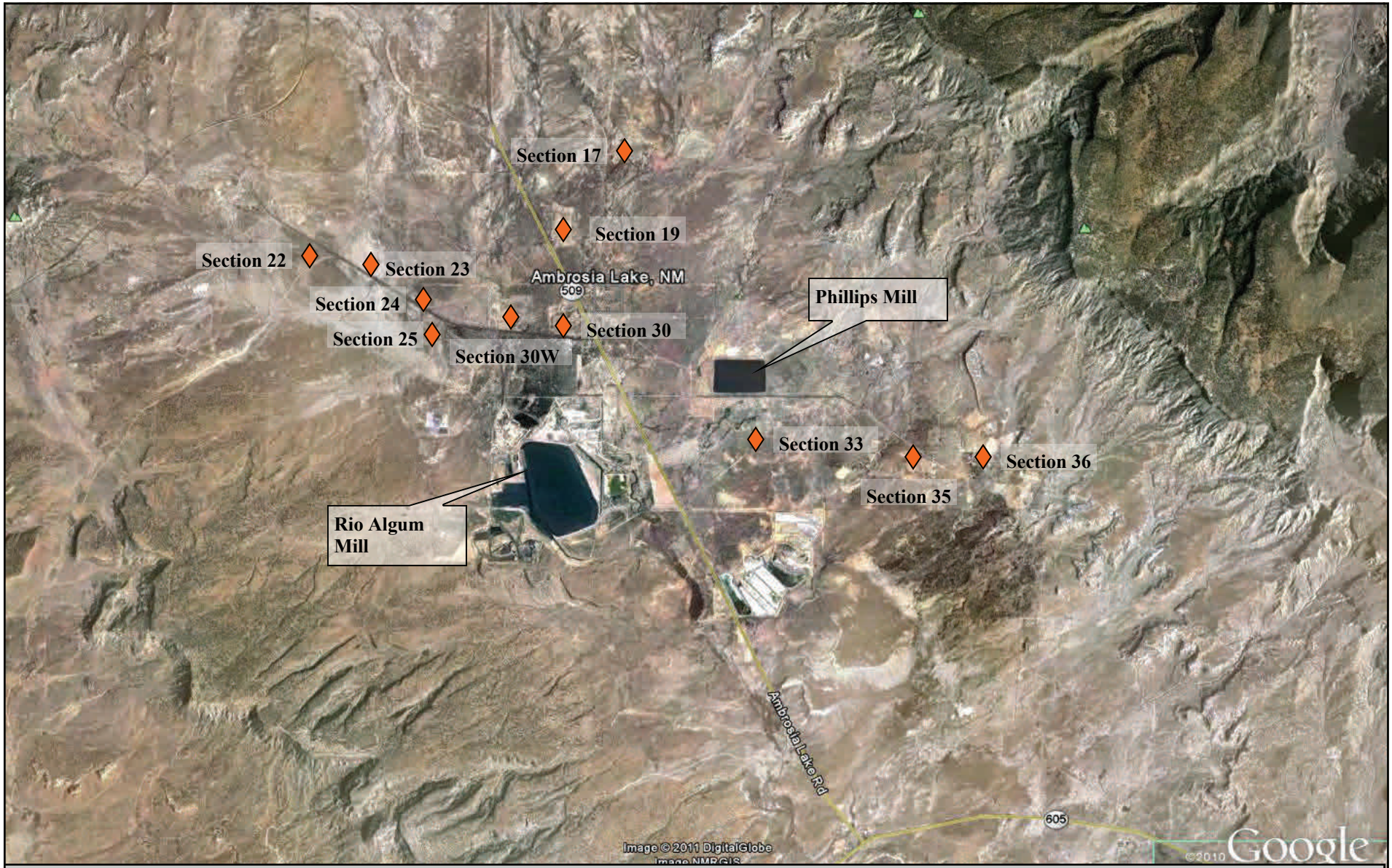

Figure 1. Ambrosia Lake Mining District, Rio Algom Mine Sites

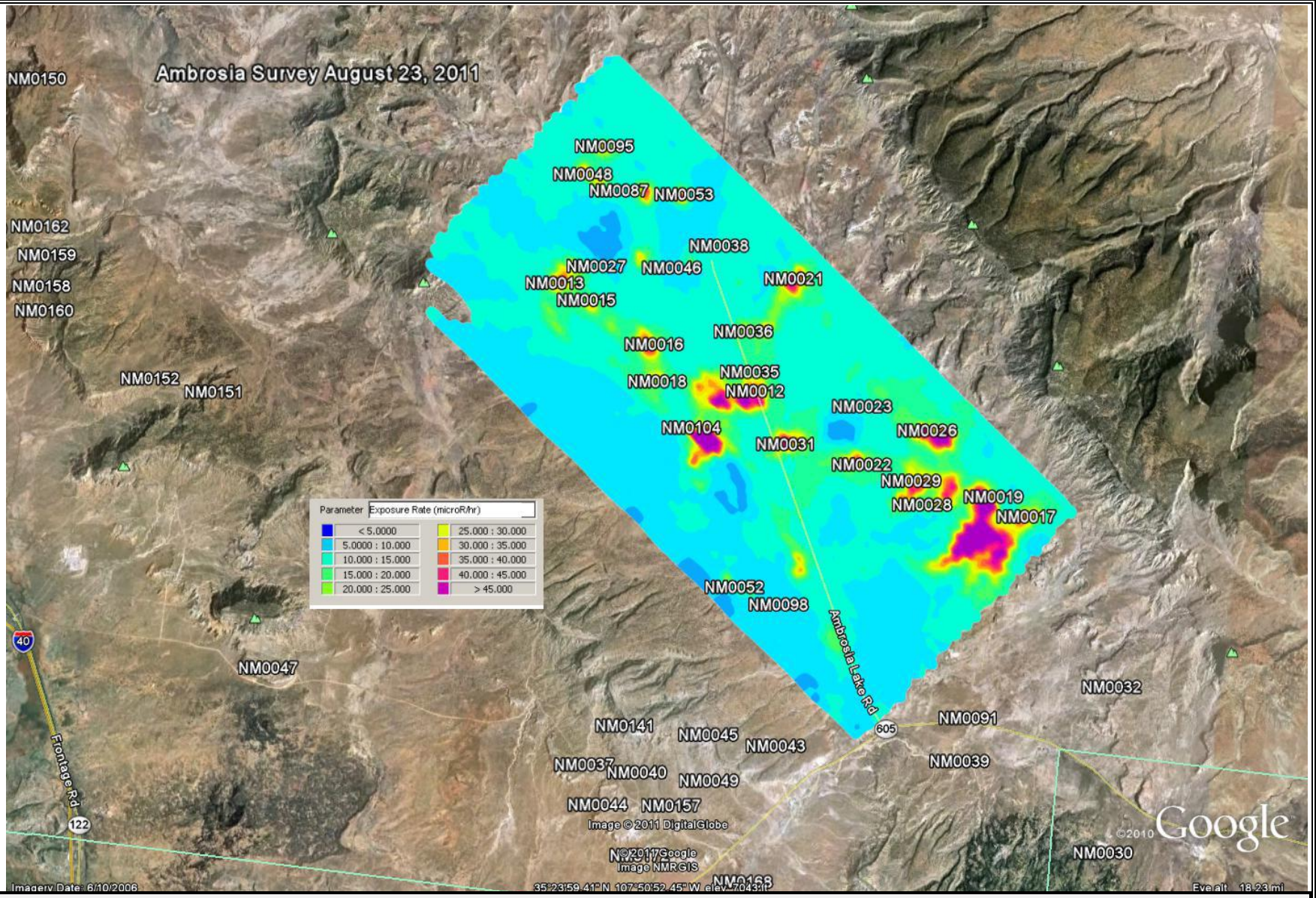

Figure 2. U.S. EPA ASPECT Exposure Rate Contour Map of Ambrosia Lake Mining District.